Chapter 5: Examining the Role of Superfund Research and Technology

Many large companies have research units that develop new or improved products. From a business perspective, research organizations are viewed as overhead, in that they provide no direct revenues to the company. In fact, they are supported by the company's profits. Nevertheless, a successful research organization can create benefits for the company far outweighing any costs if it markets its product ideas successfully. Some would argue that the success or failure of a company is often a function of the success or failure of its research units.

Government research organizations are somewhat different. Instead of developing new products to enhance the viability of the company through increased profits, their goal is to produce products or services that can be successfully used to benefit society at large. ORD's Superfund research program and OSWER's technology innovation program (TIP) can both can be viewed through this lens.

The research program's objectives are to reduce the cost of cleaning up Superfund sites, improve the efficiency of characterizing and remediating sites, and reduce the scientific uncertainties to improve decision making at Superfund sites. Through a close partnership with OSWER, research program resources are allocated to address the most significant scientific uncertainties, highest cost elements, and most complex aspects of cleaning up Superfund sites.

Conversely, the goal of TIP is to *advocate* more effective and/or less costly approaches to assess and cleanup contaminated waste sites, soil, and groundwater. TIP seeks to break down the barriers to the acceptance and adoption of new approaches for measuring and cleaning up contaminated soil and groundwater by developing and providing pertinent information to federal and state project managers, consulting engineers, responsible parties, and new technology developers.

Therefore, the key difference between the Agency's research and Superfund technology innovation efforts is that ORD develops, tests, and applies innovative technologies for contaminated sites, while Superfund's TIP complements ORD's research and development efforts by perfecting market information, benchmarking technology approaches, partnering for technology development, and disseminating information.

ORD is organized into three national laboratories, three national centers, and two offices located in 14 facilities around the country and in Washington, DC. These labs, centers,

and offices provide information and technical support to EPA program offices and Regions; state, municipal, and tribal governments; and other agencies performing environmental research, assessment, and risk management. ORD scientists also collaborate with private-sector partners to address important environmental issues.

ORD's Superfund research program consists of four program areas: (1) providing technical support to the Regions; (2) conducting Superfund innovative technology evaluations; (3) conducting longer-term research through academic institutions; and (4) conducting contaminated site research. In FY 1999, 125 full-time-equivalent (FTE) positions and $39.8 million and were devoted to Superfund research. In FY 2003, the research program received 107 FTE and $35.9 million, a decrease of 14.5 and 9.8 percent, respectively. In addition, 33 FTE and approximately $50 million were allocated to ORD in FY 2003 to support homeland security research, primarily in the area of addressing risks to human health and the environment from buildings contaminated with biological or chemical warfare agents.

In FY 2003, TIP's budget was $6.1 million and 20 FTE. Of this amount, $2.4 million was devoted to providing training and technical support to the Regions, $1.5 million was devoted to conducting studies that benchmark innovative technologies, and $1.2 million was devoted to developing and maintaining partnerships with key technology stakeholders involved in developing innovative technologies.

Research Program Observations

Whether independent of this study, or possibly as a result of it, ORD and OSWER are addressing many of the observations and recommendations in this section. The study team commends ORD and OSWER for taking the initiative to improve the effectiveness of the Superfund research program.

ORD's effectiveness in providing technical support to the Regions is directly related to ORD's building program expertise over time through its longer-term research program. The two go hand in hand. Since researchers who are experienced with hazardous waste issues are key to providing technical assistance, ORD is concerned that eliminating or greatly reducing long-term research will result in a diminished capacity to provide effective technical assistance.

ORD has two primary customers for its products and services: OSWER and the Regions. OSWER is responsible for establishing Superfund cleanup goals and objectives, and developing the policies and procedures to achieve those goals and objectives. EPA's ten regional offices are responsible for implementing the cleanup programs. Both organizations have a need for ORD's products and services, although the Regions have a much more immediate need for technical support services because of the operational nature of the program—i.e., its responsibility for cleaning up uncontrolled hazardous waste sites.

OSWER plays a key role in identifying research program needs in conjunction with the lead Region, which works with the other Regions in identifying needs. OSWER representatives and the lead Region representative interviewed felt quite strongly that, overall, an effective planning process exists with ORD. However, discussions with regional staff and management clearly suggested problems with incorporating regional needs and a disconnect between the planning process and communicating results to Superfund practitioners.

For the most part, the Regions had much praise for ORD's responding effectively to their technical support requests from remedial project managers (RPMs) or technical specialists, such as risk assessors or hydrogeologists. These requests focus on resolving problems at a particular site, and are usually of short duration, although some requests can be quite extensive and can take longer than a year. In contrast, the Regions voiced significant concerns about the utility of ORD's longer-term research program in supporting cleanup operations. In particular, both staff and management expressed concerns about the large number of projects underway that would not be completed within two to four years of identifying a problem at the sites—their window of opportunity before a cleanup decision had to be made.

Based upon this feedback, collectively ORD, OSWER, and the Regions recognized that improvements are needed in the following areas: (1) establishing a better process to ensure that practitioners are involved in setting the research agenda; (2) educating RPMs and regional management on the value and utility of longer-term research; (3) better clarifying and communicating the link between longer-term research project outputs and potential technical assistance activities; and (4) providing additional technical assistance to the Regions.

More specifically, OSWER's number one research priority is for ORD to provide technical support to the Regions in the cleanup of Superfund sites. Therefore, ORD should strive to maximize technical support to the Regions without jeopardizing its longer-term research program.

RPMs focus on the cleanup of the site(s) they are responsible for, particularly in identifying solutions to cleanup problems within certain key decision time frames—usually two to four years. While some research projects meet this window of opportunity, others may not. In those latter cases, ORD, in conjunction with OSWER headquarters, must communicate the long-term benefits of the research to the overall Superfund program.

Similarly, longer-term research projects usually include interim outputs that may be able to assist RPMs in resolving short-term, site-specific problems. ORD, in developing its research program, should strive to identify interim outputs that may benefit RPMs. As part of this effort, ORD should work with OSWER headquarters and the lead Region to identify and implement the most effective tools for communicating these interim outputs to the Regions.

Finally, better communication among ORD, OSWER headquarters, and regional management is necessary. Discussions indicate that longer-term Superfund research activities and priorities are not as clearly identified or as closely linked with the needs of regional management as they could or should be. Based upon the discussions between the two offices, the following changes have begun to be implemented:

- To establish a better process to ensure that practitioners are involved in setting the research agenda, ORD has been convening meetings with academic institutions that conduct Superfund research in each Region and with Superfund practitioners. (ORD has currently convened meetings in 6 of the 10 Regions). The objective of these meetings is to initiate a dialogue on the Superfund program's research needs.

- To ensure that RPMs and regional managers are better educated about the value and utility of longer-term research, OSWER and ORD are identifying venues, such as regional Superfund Division Director meetings, that allow ORD to discuss high-priority research needs, how the needs will be addressed, and key findings from research from previous years. (Key ORD staff attended the last Superfund Division Director meeting).

- To ensure that ORD works closer with the Superfund divisions on clarifying and communicating the link between longer-term research project outputs and potential technical assistance activities, ORD Superfund technical liaisons should be placed in the Regions so that they can (1) more effectively understand the research needs of the Regions, (2) be in a better position to support the lead Region in identifying regional research needs, and (3) be in a position to more readily communicate research products to regional management and staff.

Technology Innovation Observations

Discussions with OSWER indicate a well thought out process for undertaking new technology innovation projects. Every project is demand-oriented—i.e., driven from problems in the field. Also, although this process does not appear to incorporate a rigorous quantitative cost–benefit analysis for choosing projects, a sampling of projects reveals that the benefits in cleanup costs, timeliness of decisions, etc., derived from undertaking TIP projects considerably outweigh investment costs. See Appendix G for a description of some of these projects.

Also the greatest challenge to program success is fostering technology innovation in the field. Because RPMs must communicate their decisions to the public, they desire certainty. Implementing new technologies, despite much testing and evaluation, can reduce that certainty. Thus, some RPMs may be reluctant to try new approaches. Because the ultimate benefits of technology innovation can only occur if implemented in the field, this reluctance may raise the question of whether investments in this area are worthwhile. The sample projects in Appendix G demonstrate that tangible benefits are being realized, but additional benefits may be possible.

Performance measures do not appear to exist for technology innovation activities. Developing and implementing performance measures in this important area would provide a better understanding of how many sites were cleaned up with new technologies, and what the potential benefits to the program were in terms of site cleanup savings, reduction in cleanup time, and potential reductions in risk to human health and the environment.

Recommendation 63: ORD, OSWER, and the Regions should work together to survey Superfund managers and RPMs by June 2005 to discover if the actions taken above have addressed the concerns of the Regions about having input into the Agency's research agenda and the value and utility of long-term research.

Recommendation 64: The Assistant Administrators and/or Deputy Assistant Administrators for ORD and OSWER should meet with the Deputy Administrator no later than June 10, 2004, to discuss improvements both organizations intend to implement to improve the effectiveness of the Superfund research program. Topics to be discussed should include the items identified above.

Recommendation 65: OSWER should examine the feasibility of using a more quantitative cost–benefit methodology for selecting technology innovation projects, since resources are so limited in order to further improve program effectiveness.

Option: To maximize TIP benefits, OSWER should conduct a study (if not already conducted) that examines why certain RPMs are willing to utilize a new or innovative technology, while others are not. Such a study might determine the extent systemic reasons resulted in a particular decision versus site-specific reasons.